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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/085,303	02/28/2002	William L. Bowden	08935-257001	7607

26161 7590 02/10/2005

FISH & RICHARDSON PC
225 FRANKLIN ST
BOSTON, MA 02110

EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/085,303	BOWDEN ET AL.
	Examiner	Art Unit
	Raymond Alejandro	1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) *8-17* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/01/04 has been entered.

This communication is being provided in response to the amendment accompanying the foregoing RCE. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the present claims are rejected again over new art as seen below and for the reasons of record:

Election/Restrictions

1. This application contains claims 8-17 drawn to an invention nonelected with traverse in the reply filed on 12/08/03. A complete reply to this rejection must include cancelation of nonelected claims or other appropriate action.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blasi et al US 2002/0113622 in view of Harrison et al 2001/0028871.

The present application is directed to a lithium electrochemical cell wherein the disclosed inventive concept comprises the specific sodium content. Other limitations include the specific sodium content and the specific solvent-salts concentrations.

With reference to claims 1-5:

Blasi et al disclose an electrochemical secondary cell containing lithium salts and an anode containing lithium (ABSTRACT/SECTION 0010-0011). It is disclosed that the electrolyte can contain an organic solvent such as propylene carbonate (PC) and dimethoxyethane (DME) including combinations thereof (SECTION 0029). The electrolyte also contains a lithium salt sich as LiTFS or LiTFSI or a combination thereof (SECTION 0029).

It is noted that in the absence of any electrochemical cell component/feature derived from and/or containing sodium (Na), the electrochemical cell must exhibit zero content of sodium (Na), that is to say, no sodium (Na) content at all. Thus, if both the anode material as well as suitable salts are selected from any material and/or salt except sodium (Na), the sodium (Na)

content in the cell will be reduced to less than 600 ppm by weight. Thus, the sodium (Na) content is an inherent characteristic and/or property.

Blasi et al disclose an electrochemical cell according to the foregoing aspects. However, Blasi et al does not expressly disclose the specific sodium content.

Harrison et al disclose methods for preparing high purity lithium carbonate which can be used to prepare battery-grade lithium metal (ABSTRACT). It is disclosed that high purity lithium carbonate is also required in the emerging technologies of lithium batteries including those using lithium ion and thin film polymer electrolyte-lithium metal (SECTION 0004). It is disclosed that high purity lithium-based components minimizes lithium's rapid reactions with such substances (SECTION 0005). *That is, such substances are impurities including Na.* In particular, Harrison et al disclose the production of lithium-based components such as lithium metal being ultra-pure having maximum impurities levels (ppm) of 100 Na or 190 Na (SECTION 0030).

Harrison et al discuss how impurities may affect the purity of lithium metal, and thus, affecting the performance of the electrochemical cell or adversely affecting the current efficiency of lithium cells (SECTION 0007); or being deleterious for the operation of the electrochemical cells (SECTION 0008). Harrison et al disclose the production of battery grade lithium metal for use in lithium ion batteries (SECTIONS 0029, 0015 & 0020).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the electrochemical cell of Blasi et al by having the specific sodium content of Harrison et at because Harrison et al clearly disclose that sodium impurities may affect the purity of lithium metal, and thus, affecting the performance of electrochemical cells; and/or adversely affecting the current efficiency of lithium cells; and/or being deleterious for the

operation of the electrochemical cells. Furthermore, Harrison et al directly teach the production high-purity battery grade lithium metal for use in lithium ion batteries.

5. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sloop US 2003/0186110 in view of Harrison et al 2001/0028871.

As for claims 1-5:

Sloop makes known lithium batteries having suitable or typical electrolytes containing lithium salts dissolved in a carbonate solvent or solvent mixture (SECTION 0026). Examples of lithium salts include LiTFSI and LiTFS (lithium trifluoromethanesulfonate) dissolved in solvents such as DME (dimethoxyethane) and propylene carbonate (SECTION 0026).

It is noted that in the absence of any electrochemical cell component/feature derived from and/or containing sodium (Na), the electrochemical cell must exhibit zero content of sodium (Na), that is to say, no sodium (Na) content at all. Thus, if both the active materials as well as suitable salts are selected from any material and/or salt except sodium (Na), the sodium (Na) content in the cell will be reduced to less than 600 ppm by weight. Thus, the sodium (Na) content is an inherent characteristic and/or property.

As to claims 6-7:

Sloop further teaches a lithium salt concentration of 1.2 M in a 1:1 solvent mixture. The 1:1 ratio is equivalent to 50 % by weight of each solvent (SECTION 0026). *In this respect, it is noted that Sloop immediately envisages how to prepare specific solvent mixtures by using any combination of the examples of solvents for the lithium salt. Thus, Sloop teaches the specific*

solvent mixture (i.e. the weight content) with sufficient specificity and applicable to any possible permutations of mixed solvents.

Sloop discloses an electrochemical cell according to the foregoing aspects. However, Sloop does not expressly disclose the specific sodium content.

Harrison et al disclose methods for preparing high purity lithium carbonate which can be used to prepare battery-grade lithium metal (ABSTRACT). It is disclosed that high purity lithium carbonate is also required in the emerging technologies of lithium batteries including those using lithium ion and thin film polymer electrolyte-lithium metal (SECTION 0004). It is disclosed that high purity lithium-based components minimizes lithium's rapid reactions with such substances (SECTION 0005). *That is, such substances are impurities including Na.* In particular, Harrison et al disclose the production of lithium-based components such as lithium metal being ultra-pure having maximum impurities levels (ppm) of 100 Na or 190 Na (SECTION 0030).

Harrison et al discuss how impurities may affect the purity of lithium metal, and thus, affecting the performance of the electrochemical cell or adversely affecting the current efficiency of lithium cells (SECTION 0007); or being deleterious for the operation of the electrochemical cells (SECTION 0008). Harrison et al disclose the production of battery grade lithium metal for use in lithium ion batteries (SECTIONS 0029, 0015 & 0020).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the electrochemical cell of Sloop by having the specific sodium content of Harrison et at because Harrison et al clearly disclose that sodium impurities may affect the purity of lithium metal, and thus, affecting the performance of electrochemical cells; and/or adversely affecting the current efficiency of lithium cells; and/or being deleterious for the

operation of the electrochemical cells. Furthermore, Harrison et al directly teach the production high-purity battery grade lithium metal for use in lithium ion batteries.

6. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flandrois et al 5554462 in view of Harrison et al 2001/0028871.

Regarding claims 1-5:

Flandrois et al reveal a lithium rechargeable electrochemical cell (ABSTRACT). It is disclosed that the electrolyte is constituted by an organic solvent comprising a mixture of esters and/or ethers such as dimethoxyethane (DME) and esters selected from propylene carbonate (PC) among others (COL 4, lines 1-13). The solvents has dissolved therein a lithium salt selected from lithium trifluoromethanesulfonate and lithium trifluoromethanesulfonimide, among others (COL 4, lines 1-14).

It is noted that in the absence of any electrochemical cell component/feature derived from and/or containing sodium (Na), the electrochemical cell must exhibit zero content of sodium (Na), that is to say, no sodium (Na) content at all. Thus, if both the active materials as well as suitable salts are selected from any material and/or salt except sodium (Na), the sodium (Na) content in the cell will be reduced to less than 600 ppm by weight. Thus, the sodium (Na) content is an inherent characteristic and/or property.

On the subject of claim 6:

Flandrois et al further discuss an example wherein each cell includes an electrolyte composed of an organic solvent with was a mixture of 20 % by volume of PC and also containing DME in which the lithium salt was dissolved at a concentration of 1 mole/liter (1.0

M) (EXAMPLE 9 or COL 10, lines 10-20). *Since Flandrois et al directly disclose the use of propylene carbonate (PC) within the claimed concentration/content, as well as the teaching of constituting the electrolyte by employing a mixture of esters and/or ethers such as dimethoxyethane (DME), it is thus understood that Flandrois et al implicitly shows the claimed weight percent. In this respect, it is also noted that Flandrois clearly envisages how to prepare specific solvent mixtures by using any combination of organic solvents comprising a mixture of esters and/or ethers. Thus, Flandrois teaches the specific solvent mixture (i.e. the weight content) with sufficient specificity no matter what are the specific solvents chosen from a variety of organic solvents comprising a mixture of esters and/or ethers.*

Flandrois et al discloses an electrochemical cell according to the foregoing aspects. However, Flandrois et al does not expressly disclose the specific sodium content.

Harrison et al disclose methods for preparing high purity lithium carbonate which can be used to prepare battery-grade lithium metal (ABSTRACT). It is disclosed that high purity lithium carbonate is also required in the emerging technologies of lithium batteries including those using lithium ion and thin film polymer electrolyte-lithium metal (SECTION 0004). It is disclosed that high purity lithium-based components minimizes lithium's rapid reactions with such substances (SECTION 0005). *That is, such substances are impurities including Na.* In particular, Harrison et al disclose the production of lithium-based components such as lithium metal being ultra-pure having maximum impurities levels (ppm) of 100 Na or 190 Na (SECTION 0030).

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cells (SECTION 0008). Harrison et al disclose the production of battery grade lithium metal for use in lithium ion batteries (SECTIONS 0029, 0015 & 0020).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the electrochemical cell of Flandrois et al by having the specific sodium content of Harrison et at because Harrison et al clearly disclose that sodium impurities may affect the purity of lithium metal, and thus, affecting the performance of electrochemical cells; and/or adversely affecting the current efficiency of lithium cells; and/or being deleterious for the operation of the electrochemical cells. Furthermore, Harrison et al directly teach the production high-purity battery grade lithium metal for use in lithium ion batteries.

7. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blasi et al US 2002/0113622 in view of Boryta et al 2004/0005267.

The present application is directed to a lithium electrochemical cell wherein the disclosed inventive concept comprises the specific sodium content. Other limitations include the specific sodium content and the specific solvent-salts concentrations.

With reference to claims 1-5:

Blasi et al disclose an electrochemical secondary cell containing lithium salts and an anode containing lithium (ABSTRACT/SECTION 0010-0011). It is disclosed that the electrolyte can contain an organic solvent such as propylene carbonate (PC) and dimethoxyethane (DME) including combinations thereof (SECTION 0029). The electrolyte also contains a lithium salt such as LiTFS or LiTFSI or a combination thereof (SECTION 0029).

It is noted that in the absence of any electrochemical cell component/feature derived from and/or containing sodium (Na), the electrochemical cell must exhibit zero content of sodium (Na), that is to say, no sodium (Na) content at all. Thus, if both the anode material as well as suitable salts are selected from any material and/or salt except sodium (Na), the sodium (Na) content in the cell will be reduced to less than 600 ppm by weight. Thus, the sodium (Na) content is an inherent characteristic and/or property.

Blasi et al disclose an electrochemical cell according to the foregoing aspects. However, Blasi et al does not expressly disclose the specific sodium content.

Boryta et al disclose production of lithium compounds (TITLE) using integral processes for producing chemical and high purity grades of lithium materials (SECTION 0003). Boryta et al clearly divulge that it is desirable, from a commercial standpoint, to provide a source of lithium low in sodium content because sodium becomes reactive and potentially explosive in certain chemical processes, particularly those using lithium metals (SECTION 0004); and Boryta et al further discuss about the importance of minimizing the sodium content in the metals, in particular, to manufacture low sodium lithium metal suitable for battery applications (SECTION 0020). Above all, Boryta et al disclose the production of battery grade lithium metal containing less than 100 ppm sodium (SECTION 0022 & 0082).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the electrochemical cell of Blasi et al by having the specific sodium content of Boryta et al because Boryta et al clearly disclose the importance of producing high purity battery grade lithium materials because it is desirable, from a commercial standpoint, to provide a source of lithium low in sodium content because sodium becomes reactive and

potentially explosive in certain chemical processes, particularly those using lithium metals. Namely, Boryta et al directly teach the relevance of minimizing the sodium content in the metals, in particular, to manufacture low sodium lithium metal suitable for battery applications and/or battery grade lithium metal materials.

With particular respect to the cell containing between about 100 and 1500 ppm by weight of sodium, it would have been obvious to one skilled in the art at the time the invention was made to make Blasi et al's electrochemical cell by having the specific sodium content because Boryta et al discloses battery grade lithium metal containing less than 100 ppm sodium and it has been held that the term "***about***" allows for a weight slightly above or below of 100 ppm, hence, the ranges overlap. *In re Woodruff 16 USPQ2d 1934 (See MPEP 2144.05 [R-1] Obviousness of Ranges).* Thus, a prima facie case of obviousness exists as the claimed range overlaps the range disclosed in the prior art.

Furthermore, it would also have been obvious to a skilled artisan at the time the invention was made to make Blasi et al's electrochemical cell by having the claimed sodium content because even though Boryta et al's sodium content does not overlap or lie inside the claimed weight, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metal Corp. of America v. Banner 227 USPQ 773.* Moreover, the normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine a satisfactory and optimum sodium content or weight.

8. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sloop US 2003/0186110 in view of Boryta et al 2004/0005267.

As for claims 1-5:

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Sloop further teaches a lithium salt concentration of 1.2 M in a 1:1 solvent mixture. The 1:1 ratio is equivalent to 50 % by weight of each solvent (SECTION 0026). *In this respect, it is noted that Sloop immediately envisages how to prepare specific solvent mixtures by using any combination of the examples of solvents for the lithium salt. Thus, Sloop teaches the specific solvent mixture (i.e. the weight content) with sufficient specificity and applicable to any possible permutations of mixed solvents.*

Sloop discloses an electrochemical cell according to the foregoing aspects. However, Sloop does not expressly disclose the specific sodium content.

Boryta et al disclose production of lithium compounds (TITLE) using integral processes for producing chemical and high purity grades of lithium materials (SECTION 0003). Boryta et al clearly divulge that it is desirable, from a commercial standpoint, to provide a source of lithium low in sodium content because sodium becomes reactive and potentially explosive in certain chemical processes, particularly those using lithium metals (SECTION 0004); and Boryta et al further discuss about the importance of minimizing the sodium content in the metals, in particular, to manufacture low sodium lithium metal suitable for battery applications (SECTION 0020). Above all, Boryta et al disclose the production of battery grade lithium metal containing less than 100 ppm sodium (SECTION 0022 & 0082).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the electrochemical cell of Sloop by having the specific sodium content of Boryta et al because Boryta et al clearly disclose the importance of producing high purity battery grade lithium materials because it is desirable, from a commercial standpoint, to provide a source of lithium low in sodium content because sodium becomes reactive and potentially explosive in certain chemical processes, particularly those using lithium metals. Namely, Boryta et al directly teach the relevance of minimizing the sodium content in the metals, in particular, to manufacture low sodium lithium metal suitable for battery applications and/or battery grade lithium metal materials.

With particular respect to the cell containing between about 100 and 1500 ppm by weight of sodium, it would have been obvious to one skilled in the art at the time the invention was made to make Sloop's electrochemical cell by having the specific sodium content because Boryta et al discloses battery grade lithium metal containing less than 100 ppm sodium and it has

been held that the term "***about***" allows for a weight slightly above or below of 100 ppm, hence, the ranges overlap. *In re Woodruff 16 USPQ2d 1934 (See MPEP 2144.05 [R-1] Obviousness of Ranges).* Thus, a prima facie case of obviousness exists as the claimed range overlaps the range disclosed in the prior art.

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It is noted that in the absence of any electrochemical cell component/feature derived from and/or containing sodium (Na), the electrochemical cell must exhibit zero content of sodium (Na), that is to say, no sodium (Na) content at all. Thus, if both the active materials as well as suitable salts are selected from any material and/or salt except sodium (Na), the sodium (Na) content in the cell will be reduced to less than 600 ppm by weight. Thus, the sodium (Na) content is an inherent characteristic and/or property.

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In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the electrochemical cell of Flandrois et al by having the specific sodium content of Boryta et al because Boryta et al clearly disclose the importance of producing high purity battery grade lithium materials because it is desirable, from a commercial standpoint, to provide a source of lithium low in sodium content because sodium becomes reactive and potentially explosive in certain chemical processes, particularly those using lithium metals. Namely, Boryta et al directly teach the relevance of minimizing the sodium content in the metals, in particular, to manufacture low sodium lithium metal suitable for <u>battery applications and/or battery grade lithium metal materials.</u>

With particular respect to the cell containing between <u>about 100</u> and 1500 ppm by weight of sodium, it would have been obvious to one skilled in the art at the time the invention was made to make Flandrois et al's electrochemical cell by having the specific sodium content because Boryta et al discloses battery grade lithium metal containing less than 100 ppm sodium

and it has been held that the term "***about***" allows for a weight slightly above or below of 100 ppm, hence, the ranges overlap. *In re Woodruff 16 USPQ2d 1934 (See MPEP 2144.05 [R-1] Obviousness of Ranges).* Thus, a prima facie case of obviousness exists as the claimed range overlaps the range disclosed in the prior art.

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Response to Arguments

10. Applicant's arguments, see the amendment of 12/01/04 and the declaration under 37 CFR 1.132 dated 12/01/04, with respect to the rejections of claim 1-7 under the 35 USC 102 statutory basis have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the newly found prior art references.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745